# Horo - Developer Guide



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# 1. Introduction

## 1.1. About the Application

**Horo** is a command-line interface scheduling application. It helps the user maintain a to-do list and a calendar, and posts timely reminders on their desktop.

## 1.2. Purpose

This guide specifies the architecture and software design decisions for Horo, and instructions for building upon the current codebase. This is done in hopes of ensuring extensibility and maintainability of Horo for both current and future developers.

## 1.3. How to use this Guide

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# 2. Setting up

Refer to the guide here.

# 3. Design

## 3.1. Architecture

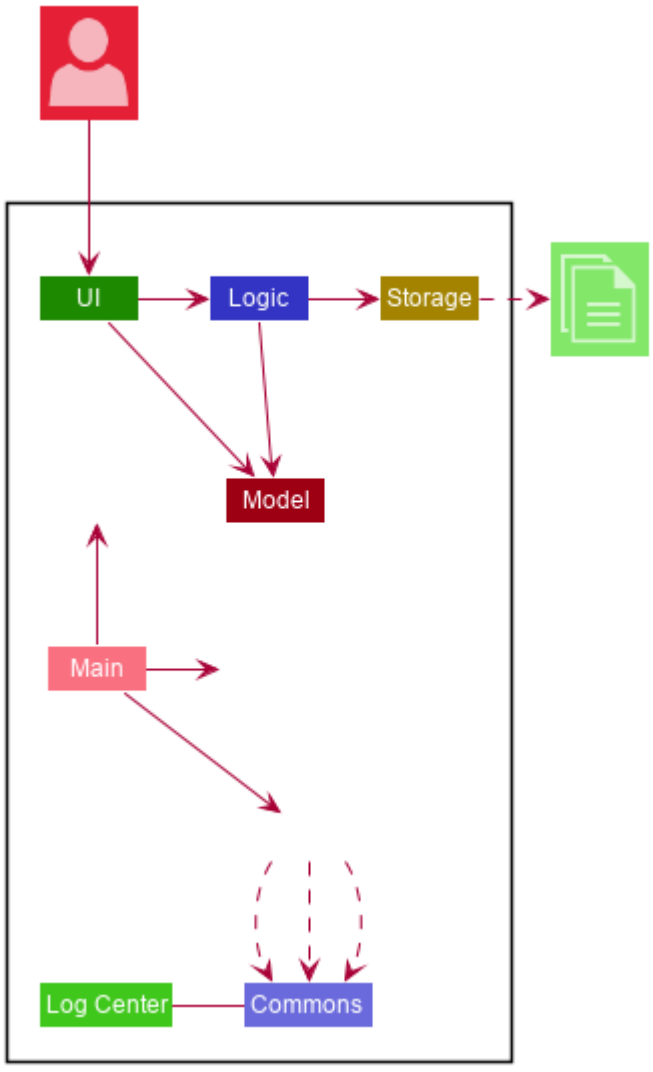



*Figure 1. Architecture Diagram*

The ***Architecture Diagram*** given above explains the high-level design of the App. Given below is a quick overview of each component.

`Main` has two classes called `Main` and `MainApp`. It is responsible for,

- At app launch: Initializes the components in the correct sequence, and connects them up with each other.
- At shut down: Shuts down the components and invokes cleanup method where necessary.

**`Commons`** represents a collection of classes used by multiple other components. The following class plays an important role at the architecture level:

- `LogsCenter` : Used by many classes to write log messages to the App's log file.

The rest of the App consists of four components.

- **`UI`**: The UI of the App.
- **`Logic`**: The command executor.
- **`Model`**: Holds the data of the App in-memory.
- **`Storage`**: Reads data from, and writes data to the hard disk.

Each of the four components

- Defines its *API* in an `interface` with the same name as the Component.
- Exposes its functionality using a `{Component Name}Manager` class.

For example, the `Logic` component (see the class diagram given below) defines it's API in the `Logic.java` interface and exposes its functionality using the `LogicManager.java` class.

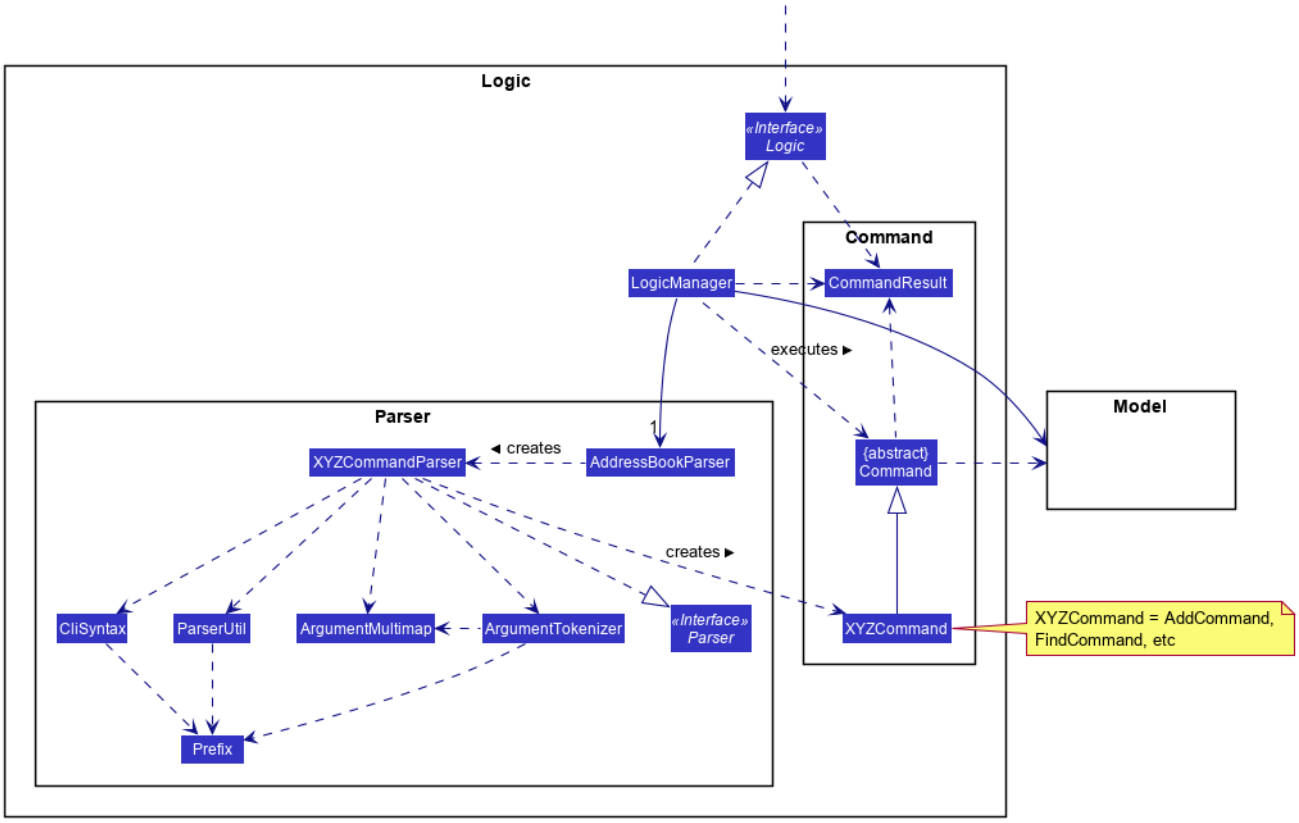



*Figure 2. Class Diagram of the Logic Component*

## How the architecture components interact with each other

The *Sequence Diagram* below shows how the components interact with each other for the scenario where the user issues the command `delete 1`.

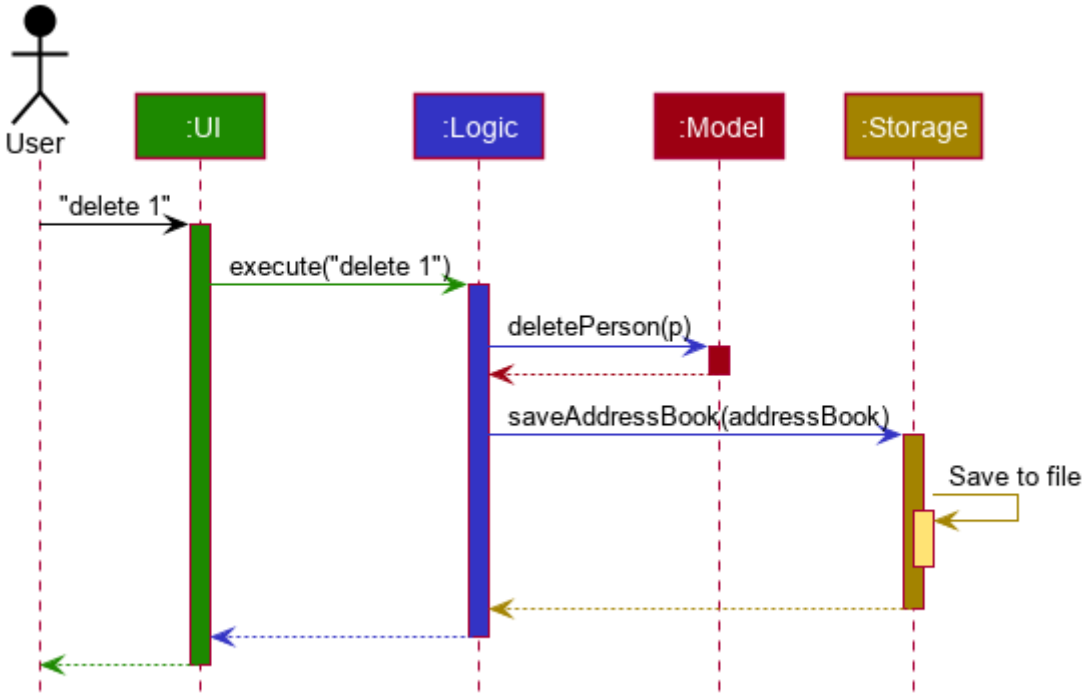



*Figure 3. Component interactions for `delete 1` command*

The sections below give more details of each component.

## 3.2. UI component

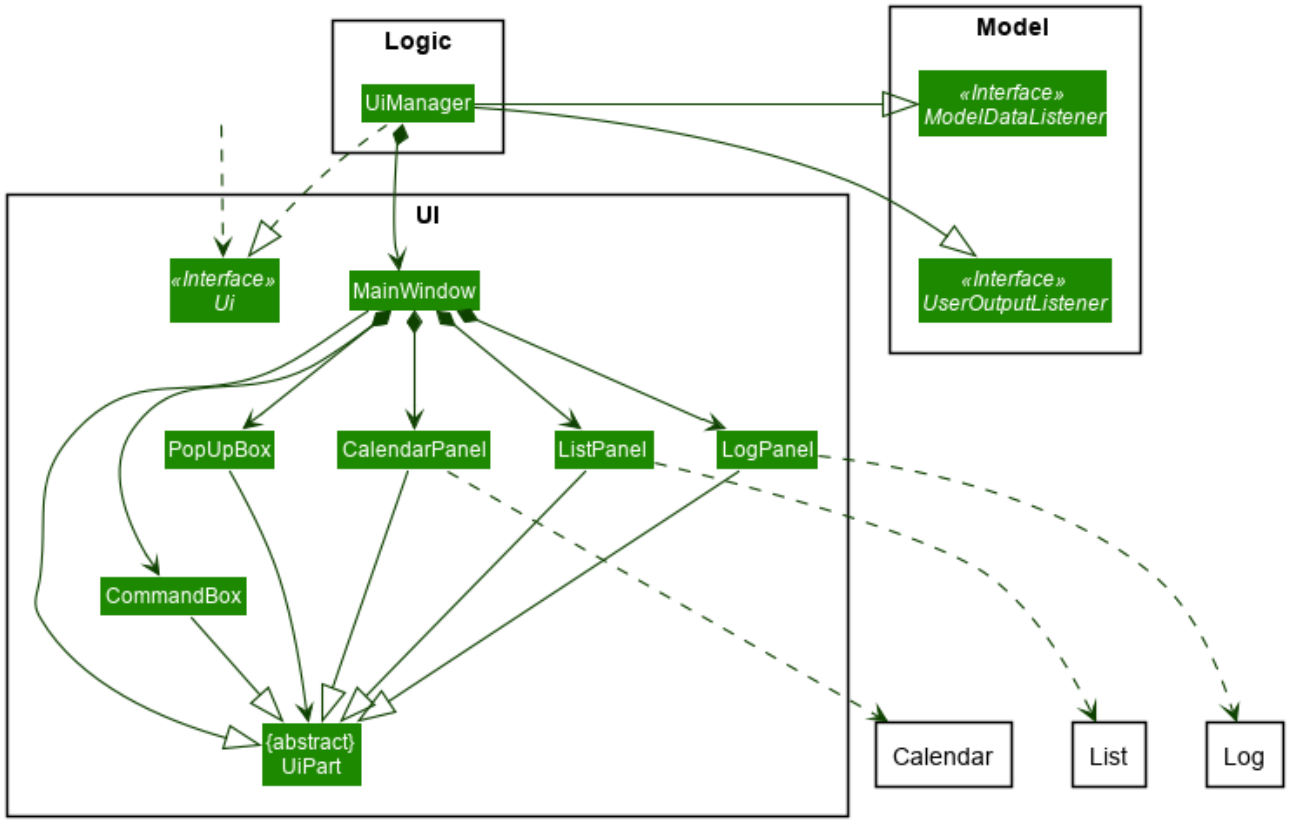



*Figure 4. Main structure of the UI Component*

**API** : `Ui.java`

The UI consists of a `MainWindow` that is contains 3 main view parts - `CalendarPanel`, `ListPanel`, `LogPanel`. It also holds several other UI parts e.g. `PopUpPanel` and `Command Box`. Every one of the UI classes will abstract from the abstract `UiPart` class.

The `UI` component uses JavaFx UI framework, and layout of these UI parts are defined in `.fxml` files which are found in the `src/main/resources/view` folder. One example of the layout would be: `MainWindow`, whose FXML link is specified in `MainWindow.fxml`

The `UI` component does the following:

- Executes user two different types commands using the `Logic` component.
    - One command, when executed, affect the actual Events.
    - The other command is executed to change the view of the UI. There are currently 3 main views in the application: `CalendarPanel`, `ListPanel`, `LogPanel`.
- Listens for any changes in both lists of Tasks and Events using a listener: `ModelDataListener`.

### 3.2.1. Calendar UI View

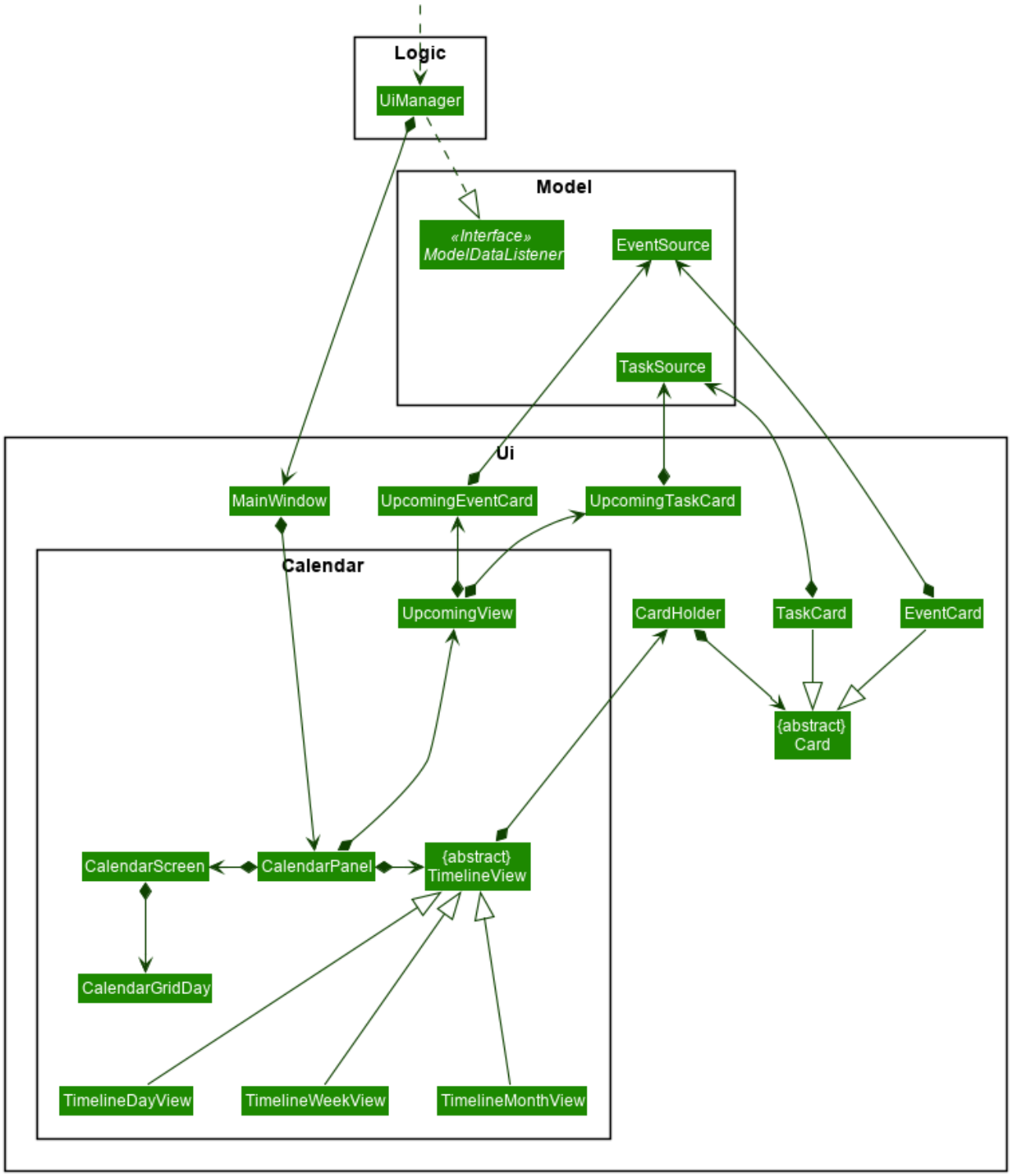



*Figure 5. Structure of the Calendar UI View*

The Calendar View is made up of the `CalendarPanel`, which holds several different other UI parts linked together to form the overall UI. In the Calendar View, it displays three different UI parts of the Calendar: `CalendarScreen`, `TimelineView` and `UpcomingView`.

`CalendarScreen` is the screen which displays the calendar of a certain month and year to the user. It contains 6 x 7 instance of `CalendarGridDay`, which displays the days of the month.

`TimelineView` is the screen which displays the timeline using 3 different classes which abstract from `TimelineView`.

- `TimelineDayView` displays the timeline of a particular day in a certain month and year.
- `TimelineWeekView` displays the timeline of a particular week. The week is according to the `CalendarScreen`, where each row represents a week of a month.
- `TimelineMonthView` displays the timeline of a particular month in a certain year.

Each of these timeline will hold up to a certain amount of `CardHolder` depending on the type of `TimelineView`. Each of these `CardHolder` will then hold an amount of `Card` for displaying the event name and date. The details of `Card` will be explained in the one of the next few sections.

`UpcomingView` represents a miniature list of Events and Tasks that has a start date or due date in the same month as the user's system current month, but not before the date as the user's date. This list will then hold up to a certain amount of `UpcomingEventCard` and `UpcomingTaskCard` which will be explained together with `Card` as well.

### 3.2.2. List UI View

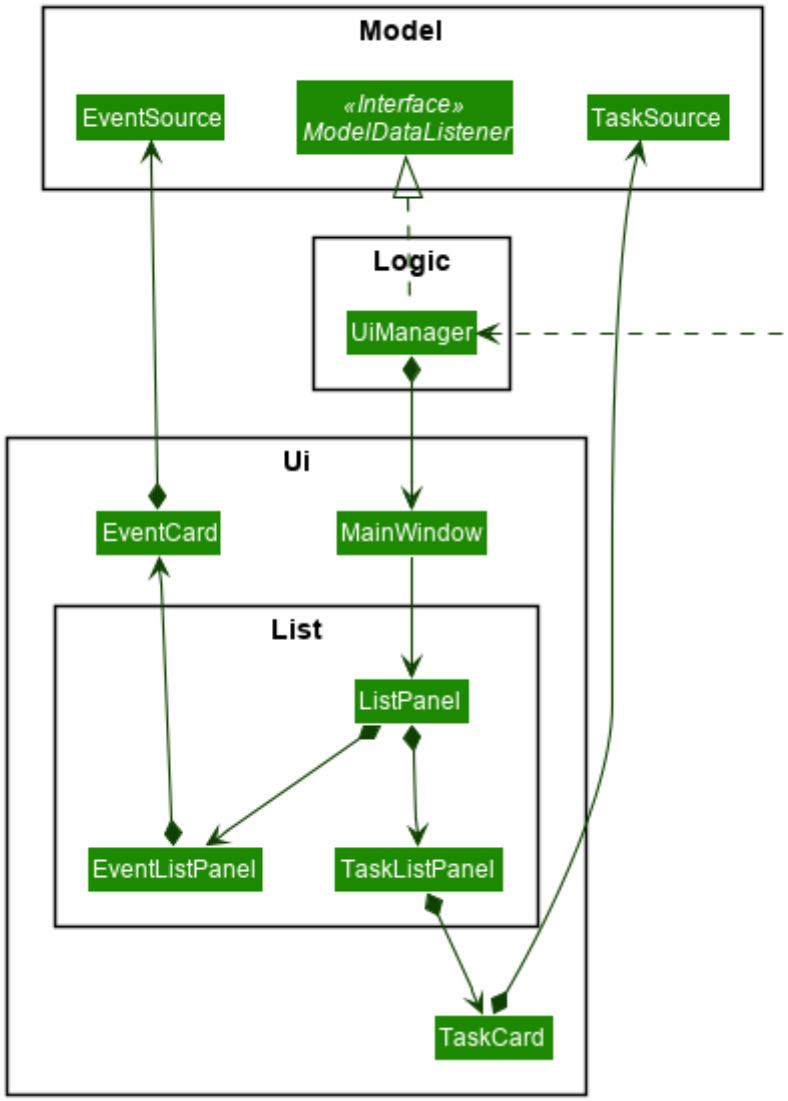



*Figure 6. Structure of the List UI View*

The List View is made up of the `ListPanel` which contains two lists views, `EventListView` and `TaskListView`

- `EventListView` displays the list of Events containing every piece of information of the Events.
- `TaskListView` displays the list of Task, containing every piece of information of each Task.

Similar to `TimelineView`, `EventListView` and `TaskListView` will contain a list of `Card` to display the information.

### 3.2.3. Log UI View

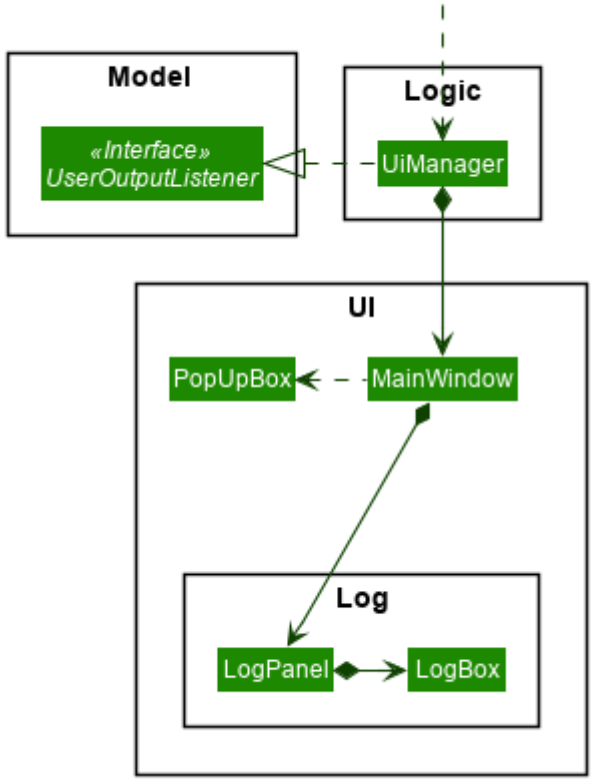



*Figure 7. Structure of the Log UI View*

The Log View is made up of the `LogPanel` which contains the list of `LogBox`.

`LogBox` displays literal information back to the user when it is called by `MainWindow` when it listens for a command.

`PopUpBox` is rather similar to LogBox. It holds up to the same amount of information, as much until the size of the application window, and collapses the rest. It represents the pop up that animates and displays for a few seconds to the user about the given command.

### 3.2.4. Card UI

Firstly, there are two types of ways to display information to the user regarding a Event or Task.

- For Events, it is `EventCard`, which is abstracted from the `Card` abstract class, followed by `UpcomingEventCard`
- For Tasks, it is `TaskCard`, which is abstracted from the `Card` abstract class, followed by

`UpcomingTaskCard`.

An `EventCard` may display the following information:

1. Event Description
2. Event Start Date
3. Event End Date (Optional)
4. Event Reminder Date (Optional)
5. Event Tags (Optional)
6. Event Index (For deleting or editing)

An `TaskCard` may display the following information:

1. Task Description
2. Task Due Date (Optional)
3. Task Reminder Date (Optional)
4. Task Tags (Optional)
5. Task Index (For deleting or editing)

As for `UpcomingEventCard` and `UpcomingTaskCard`, they only hold the Description of the Event or Task.

# 3.3. Logic component

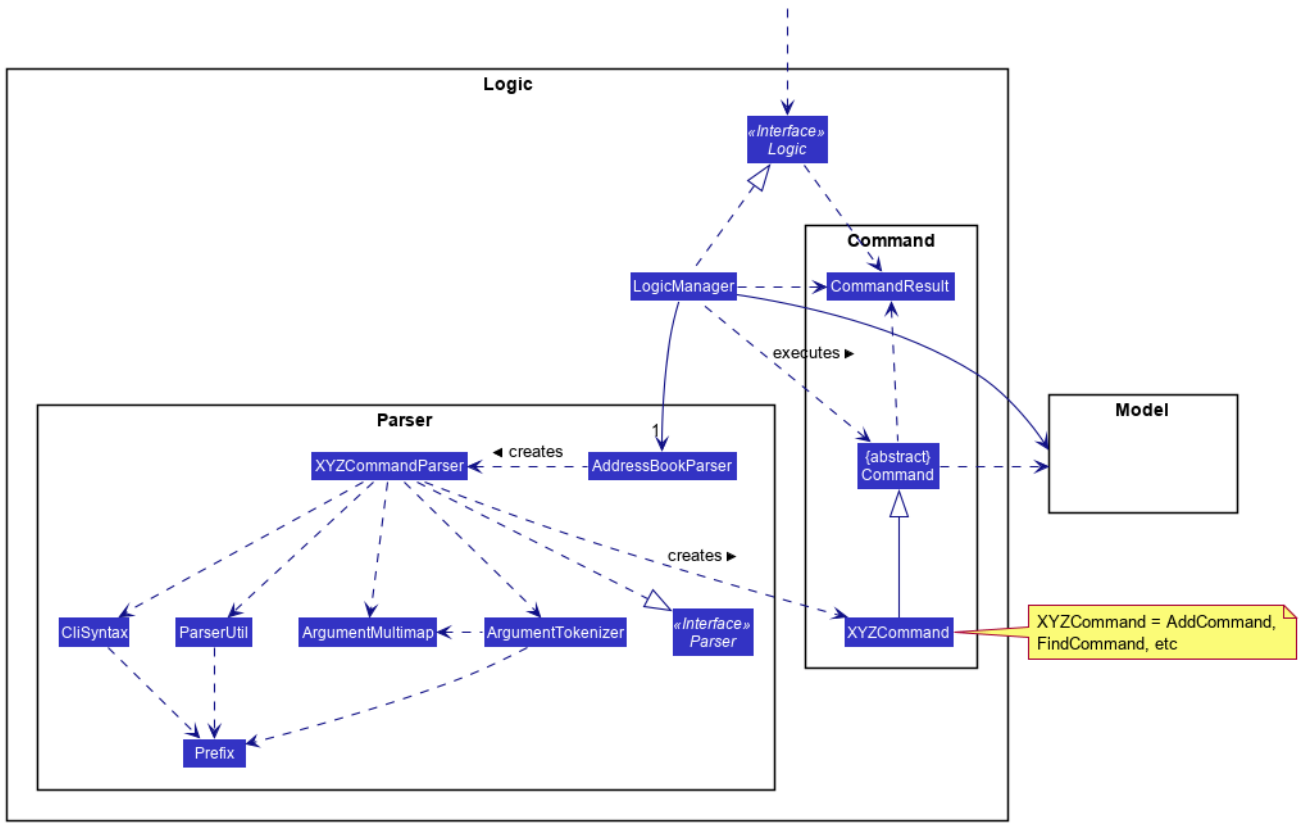



*Figure 8. Structure of the Logic Component*

**API** : `Logic.java`

1. `Logic` uses the `AddressBookParser` class to parse the user command.
2. This results in a `Command` object which is executed by the `LogicManager`.
3. The command execution can affect the `Model` (e.g. adding a person).
4. The result of the command execution is encapsulated as a `CommandResult` object which is passed back to the `Ui`.
5. In addition, the `CommandResult` object can also instruct the `Ui` to perform certain actions, such as displaying help to the user.

Given below is the Sequence Diagram for interactions within the `Logic` component for the `execute("delete 1")` API call.

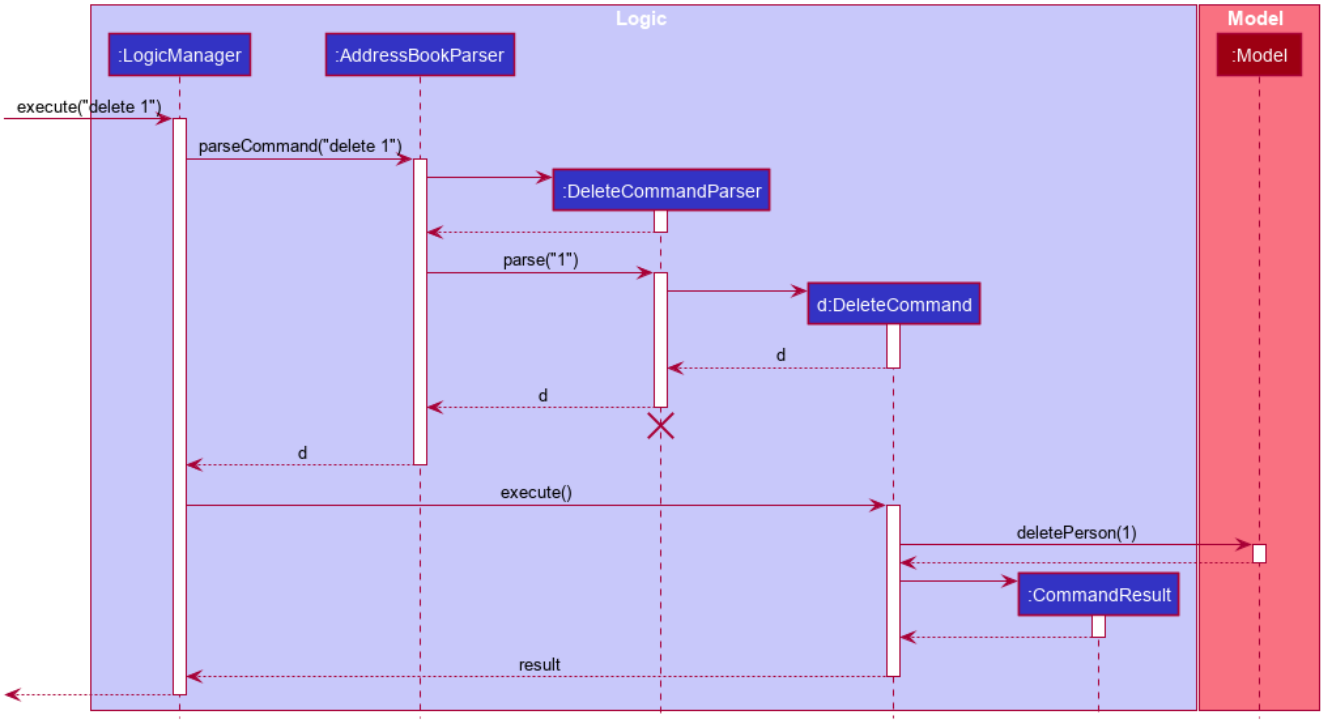



*Figure 9. Interactions Inside the Logic Component for the `delete 1` Command*

| NOTE | The lifeline for `DeleteCommandParser` should end at the destroy marker (X) but due to a limitation of PlantUML, the lifeline reaches the end of diagram. |
|---|---|

# 3.4. Model component

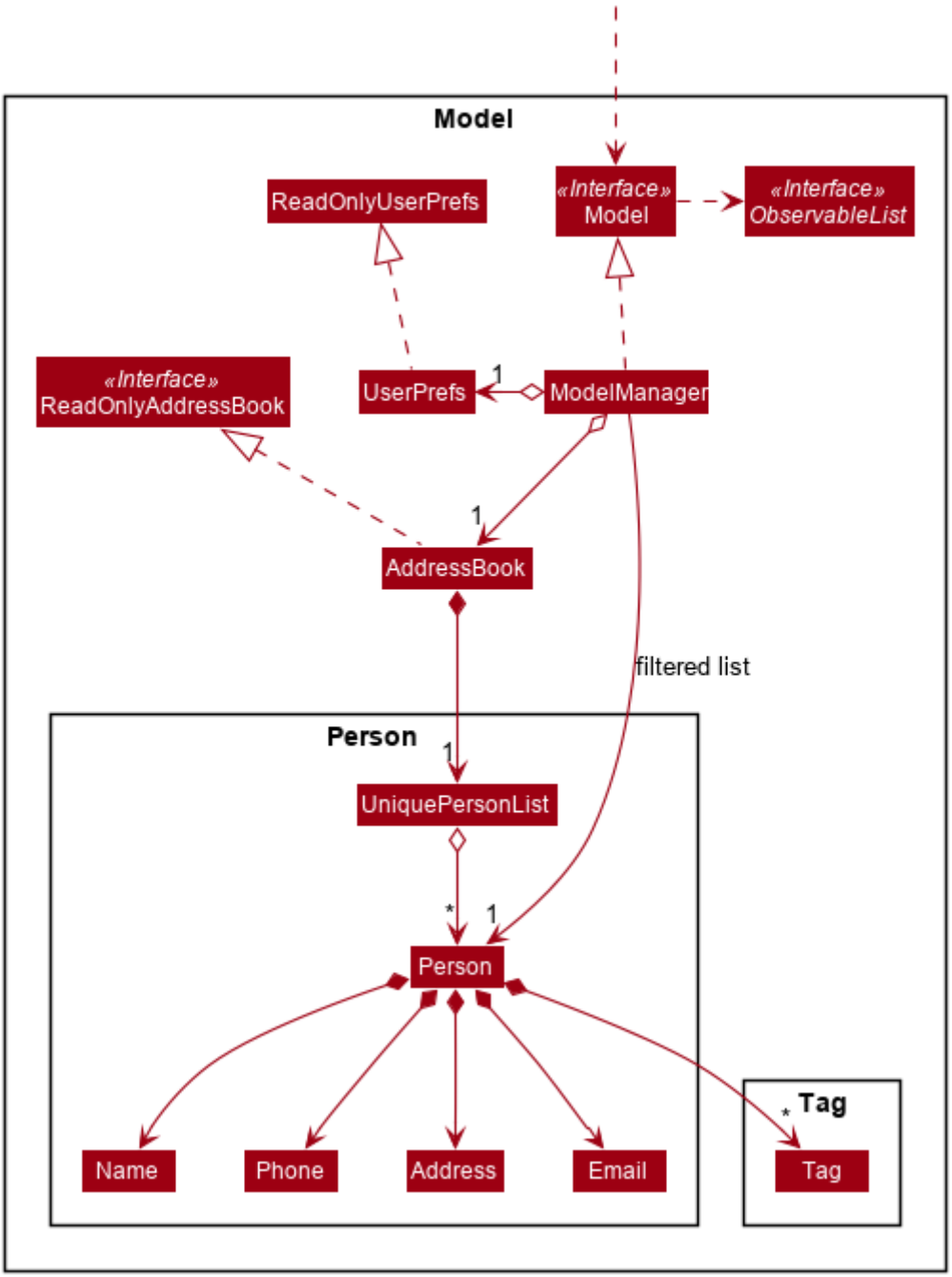



*Figure 10. Structure of the Model Component*

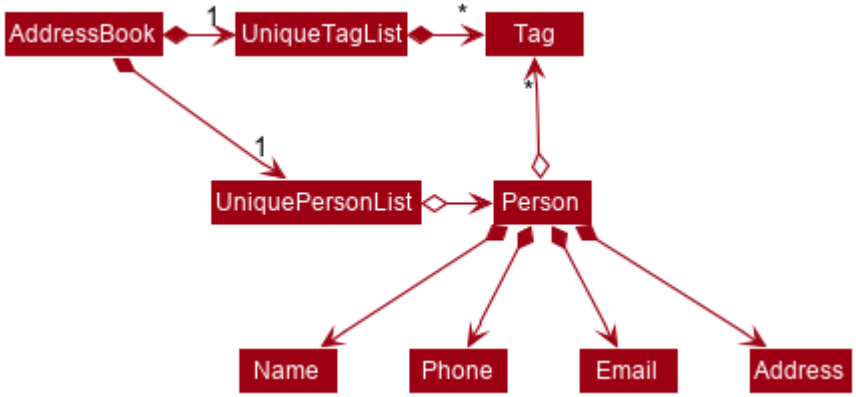
**API** : `Model.java`

The `Model`,

- stores a `UserPref` object that represents the user's preferences.
- stores the Address Book data.
- exposes an unmodifiable `ObservableList<Person>` that can be 'observed' e.g. the UI can be bound to this list so that the UI automatically updates when the data in the list change.
- does not depend on any of the other three components.

NOTE

As a more OOP model, we can store a `Tag` list in `Address Book`, which `Person` can reference. This would allow `Address Book` to only require one `Tag` object per unique `Tag`, instead of each `Person` needing their own `Tag` object. An example of how such a model may look like is given below.

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## 3.5. Storage component

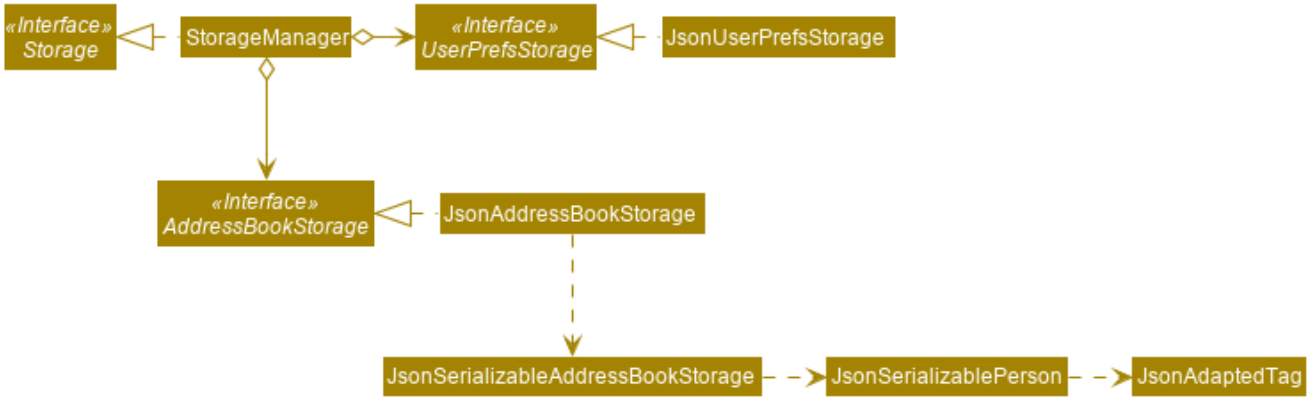



*Figure 11. Structure of the Storage Component*

**API** : `Storage.java`

The `Storage` component,

- can save `UserPref` objects in json format and read it back.
- can save the Address Book data in json format and read it back.

## 3.6. Common classes

Classes used by multiple components are in the `seedu.addressbook.commons` package.

# 4. Implementation

This section describes some noteworthy details on how certain features are implemented.

# 4.1. Undo/Redo feature

## 4.1.1. Implementation Details

The undo/redo mechanism is facilitated by `UndoRedoManager`, which contains `undoStateList` - a history of `ModelLists`. Each `ModelList` object contains two lists: one to store `EventSources` and the other to store `TaskSources`, together representing the state of all event and task data at that point in time. `UndoRedoManager` also contains a `undoIndex`, which keeps track of the index of the `ModelList` being used presently.

A key point to take note of is that `ModelManager` contains an `eventList` (a list of `EventSources`) and a `taskList` (a list of `TaskSources`), both of which cannot be reinitialized. This is because these two lists are directly in sync with the GUI; changes to these specific list instances are reflected as changes to the GUI, but changes to other copies of `EventSource` or `TaskSource` lists will not affect the GUI. Hence, the history of `ModelLists` held by `UndoRedoManager` stores deep-copies of `EventSource` and `TaskSource` lists. Should there be a need to revert back to a past or future state (if undo or redo is called), these lists will retrieve their data from the appropriate copy of `ModelList` in the list of duplicates.

`UndoRedoManager` also implements the following operations:

- `UndoRedoManager#commit(ModelList state)` — Adds the new state (which contains a deep-copied version of `TaskSource` and `EventSource` lists) to the `undoStateList`
- `UndoRedoManager#undo()` — Restore `eventList` and `taskList` in `ModelManager` to their previous versions from the appropriate duplicate in `undoStateList` via an `ModelListListener`
- `UndoRedoManager#redo()` — Restore `eventList` and `taskList` in `ModelManager` to their future versions from the appropriate duplicate in `undoStateList` via an `ModelListListener`
- `UndoRedoManager#clearFutureHistory()` -- Delete all `ModelList` states that occur in `undoStateList` after the index given by the `undoIndex`

The `UndoCommand` and `RedoCommand` will interact directly with `UndoRedoManager` while other state-changing commands (such as adding or deleting tasks) will interact only with `ModelManager`.

There are two key **Listener** interfaces that help us achieve the desired undo-redo functionality:

- `ModelListListener`
- `ModelResetListener`

These listener interfaces each contain a single method, `ModelListListener` contains `onModelListChange(ModelList list)` and `ModelResetListener` contains `onModelReset(ModelList state, Object caller)`.

The `UndoRedoManager` implements the `ModelListListener` interface's method `onModelListChange(ModelList list)` to "listen" for any changes to `ModelManager`'s lists (`eventList` or `taskList`). (e.g. when an event or task is added or deleted) If such a change exists, it will be handled by first instantiating a `ModelList` with a deep-copied version of the `taskList` and the modified `eventList`, calling `UndoRedoManager#clearFutureHistory()`, and calling `UndoRedoManager#commit(ModelList state)` to commit the state.

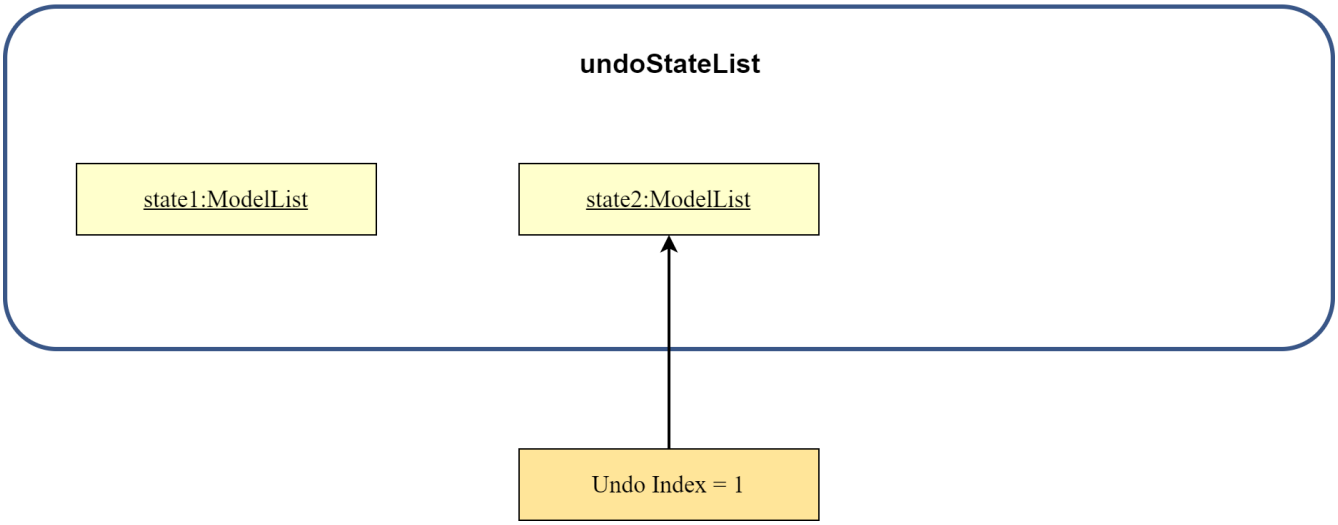
The `ModelManager` implements the `ModelResetListener` interface's method `onModelReset(ModelList state, Object caller)` to "listen" for any undo or redo being executed. This will be handled by resetting `ModelManager`'s `eventList` and `taskList` data to match the data of the `ModelList` with index `undoIndex` in `undoStateList`.

Given below is an example usage scenario and how the undo/redo mechanism behaves at each step.

Step 1. The user runs the program for the first time. The `UndoRedoManager` will be initialized with the initial `undoStateList`. A `ModelList` will be added to `undoStateList` and the `undoIndex` will point to that single `ModelList` in the list.


Step 2. The user executes `add_event "Suntec City Computer Fair" --at "17/11/2019 12:00"`. The event will be added to `ModelManager`'s `eventList`. Then, `UndoRedoManager#onModelListChange(ModelList list)` will be called (as there has been a change to the `eventList`), deep-copying the modified `eventList` and `taskList` and instantiating a new state `ModelList` with these copies. All future states beyond the `undoIndex` will be cleared as they are no longer useful. In this particular case, there are no future states to be cleared. Finally, the new `ModelList` state will be committed; added to `undoStateList`. The `undoIndex` is incremented by one to contain the index of the newly inserted model list state.

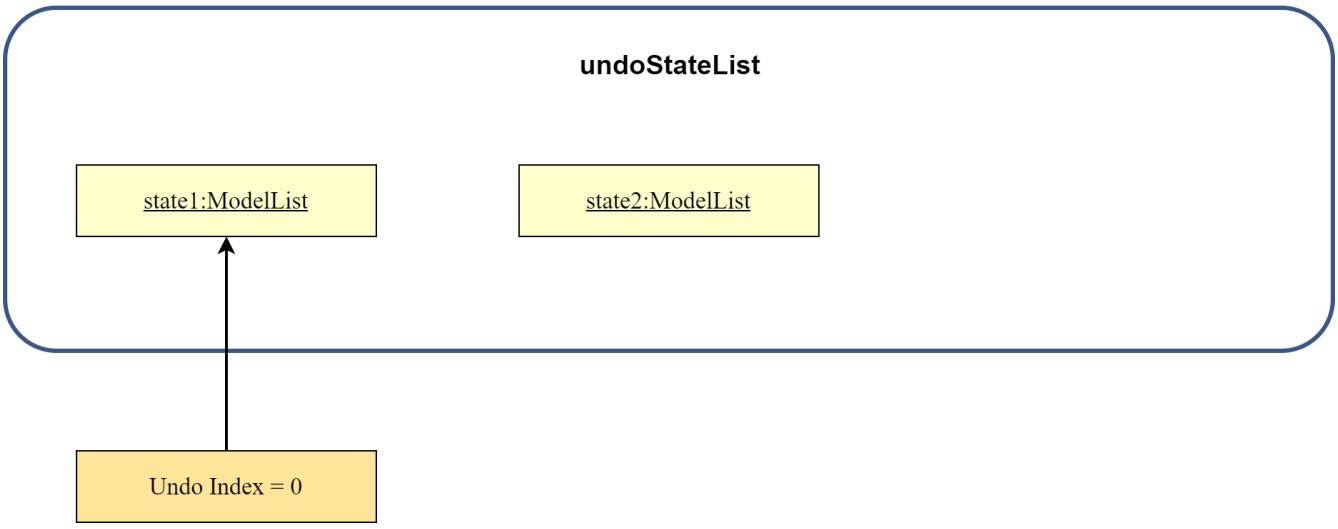
After command "add_event..."




**NOTE** If a command fails its execution, it will not result in any change to `ModelManager#eventList` or `ModelManager#taskList`. Hence, there is no change to trigger the listener methods and thus no `ModelList` will be saved to `undoStateList`.

Step 3. Suppose the user decides that adding the task was a mistake. He/she then executes the undo command to rectify the error. The undo command will decrement the `undoIndex` by one to contain the index of the previous undo redo state, thereafter triggering the `ModelManager#onModelReset` method. This method updates `ModelManager`'s `eventList` and `taskList` data to match the data of the `ModelList` with index `undoIndex` in `undoStateList`.

After command "undo"




**NOTE** If the `undoIndex` is 0, pointing to the initial model list state, then there are no previous model list states to restore. The undo command uses `UndoRedoManager#canUndo()` to check if this is the case. If so, it will return an error to the user rather than attempting to perform the undo.

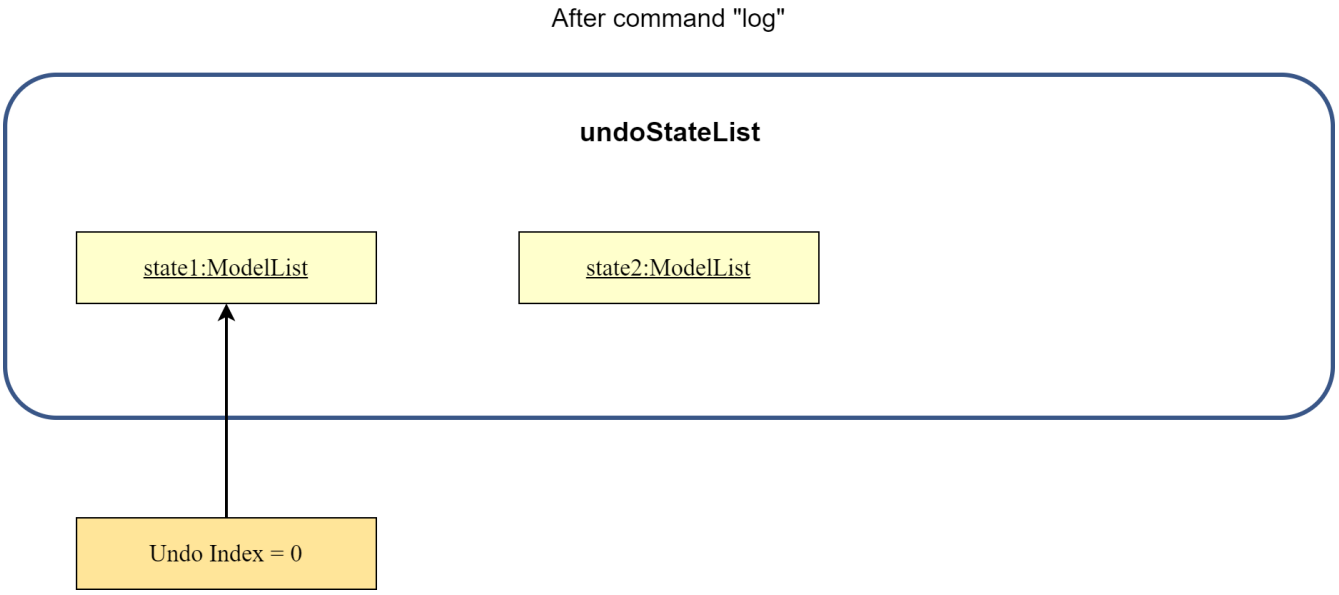
The following sequence diagram shows how the undo operation works:

**NOTE** The lifeline for `UndoCommand` should end at the destroy marker (X) but due to a limitation of PlantUML, the lifeline reaches the end of diagram.

The redo command does the opposite — it calls `UndoRedoManager#redo()`, which increments the `undoIndex` by one to contain the index of the previously undone state. The `ModelResetListener` then causes `ModelManager#eventList` and `ModelManager#taskList` to reset their data to this state's list data.

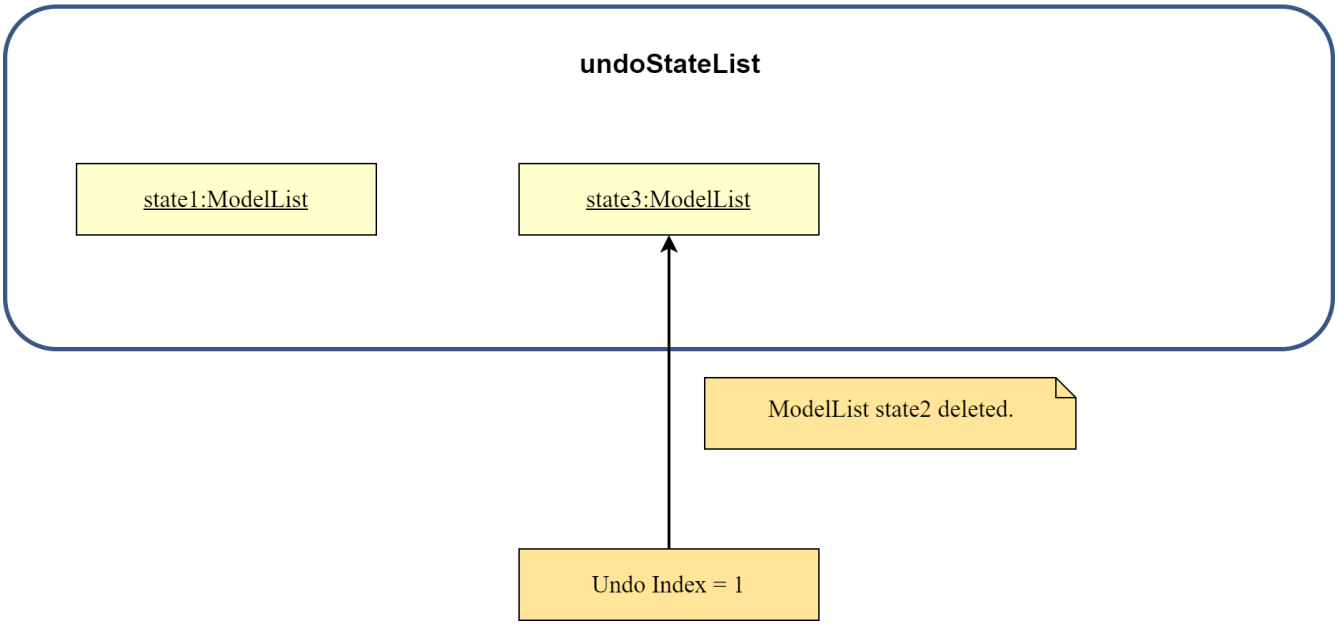
**NOTE** If the `undoIndex` is at index `undoStateList.size() - 1`, pointing to the latest model list state, then there are no undone model list states to restore. The `redo` command uses `UndoRedoManager#canRedo()` to check if this is the case. If so, it will return an error to the user rather than attempting to perform the redo.

Step 4. The user decides to execute the command `log`. Non-state-changing commands such as `log` do not manipulate task and event data. Since no changes to `taskList` or `eventList` have been made, the listener methods will not be triggered and no `ModelList` will be saved to `undoStateList`. Thus, the `undoStateList` remains unchanged.

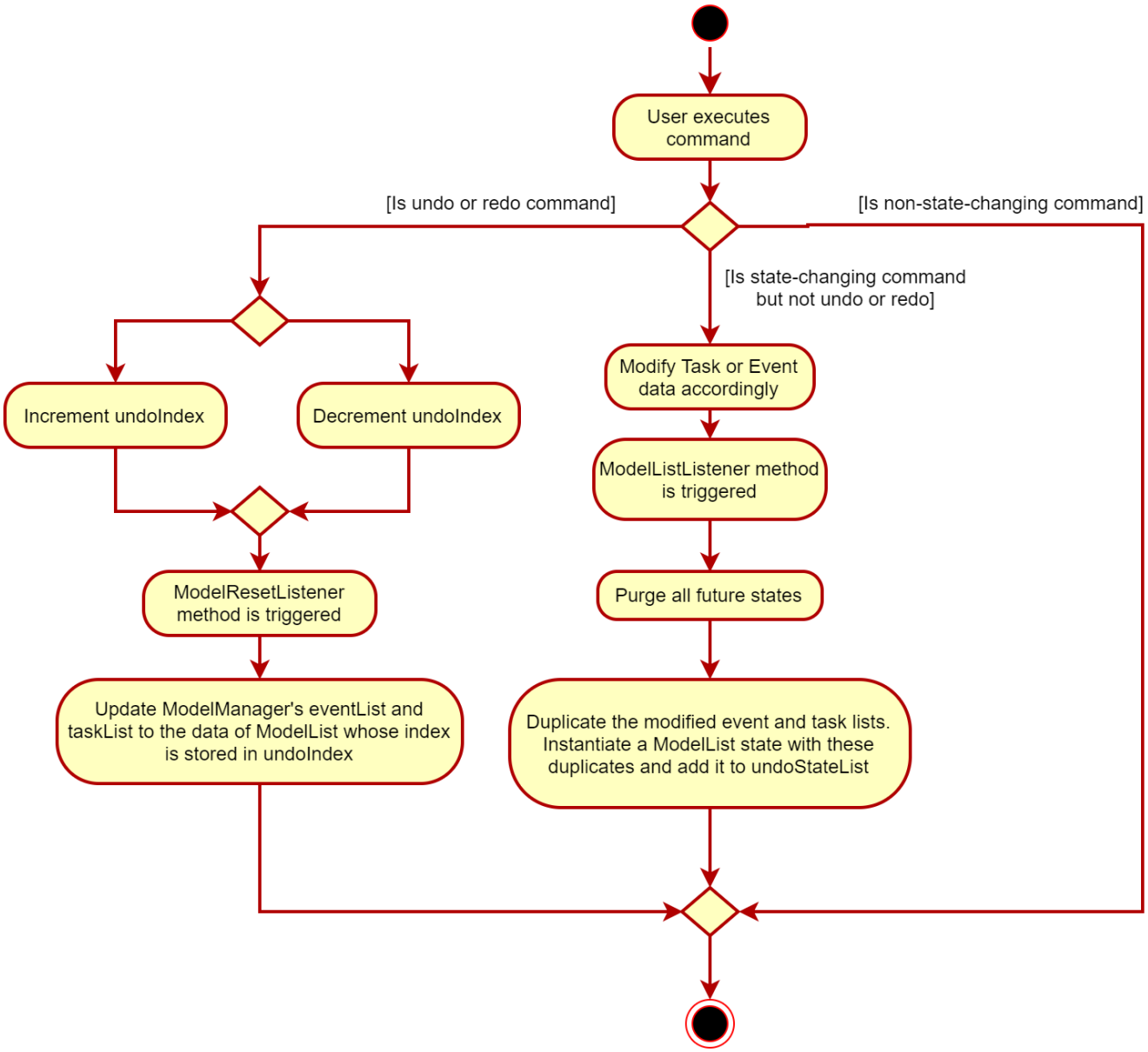



Step 5. The user executes `delete_event 1`, removing the event from `ModelManager`'s `eventList`. `UndoRedoManager#onModelListChange(ModelList list)` will be called (as there has been a change to the `eventList`), purging all future states beyond the `undoIndex` as they are no longer useful. The modified `eventList` and `taskList` will be deep-copied and a new `ModelList` containing the deep-copies will also be added to `undoStateList`. The `undoIndex` is incremented by one to contain the index of the newly inserted model list state.

After command "delete_event 1"




The following activity diagram summarizes what happens when a user executes a new command:




### 4.1.2. Design Considerations

**Aspect: How undo & redo executes**

- **Alternative 1 (current choice):** Saves `EventSource` and `TaskSource` data every time a change has been made.
  - Pros: Easy to understand and implement.
  - Cons: Performance issues may arise due to the relatively larger memory usage required.
- **Alternative 2:** Individual command knows how to undo/redo by itself; inverse functions have to be implemented (if I undo the deletion of a person, it would be equivalent to adding him back to the list)
  - Pros: Uses less memory as we only need to keep track of what commands have been executed and their parameters, as opposed to storing all task and event data between every change.
  - Cons: Every command will have to be implemented twice, since their inverse operations will all be different. This is compounded by the fact that we have to ensure the correctness of

every inverse operation individually as well.

# 4.2. Notification System

## 4.2.1. Class Architecture

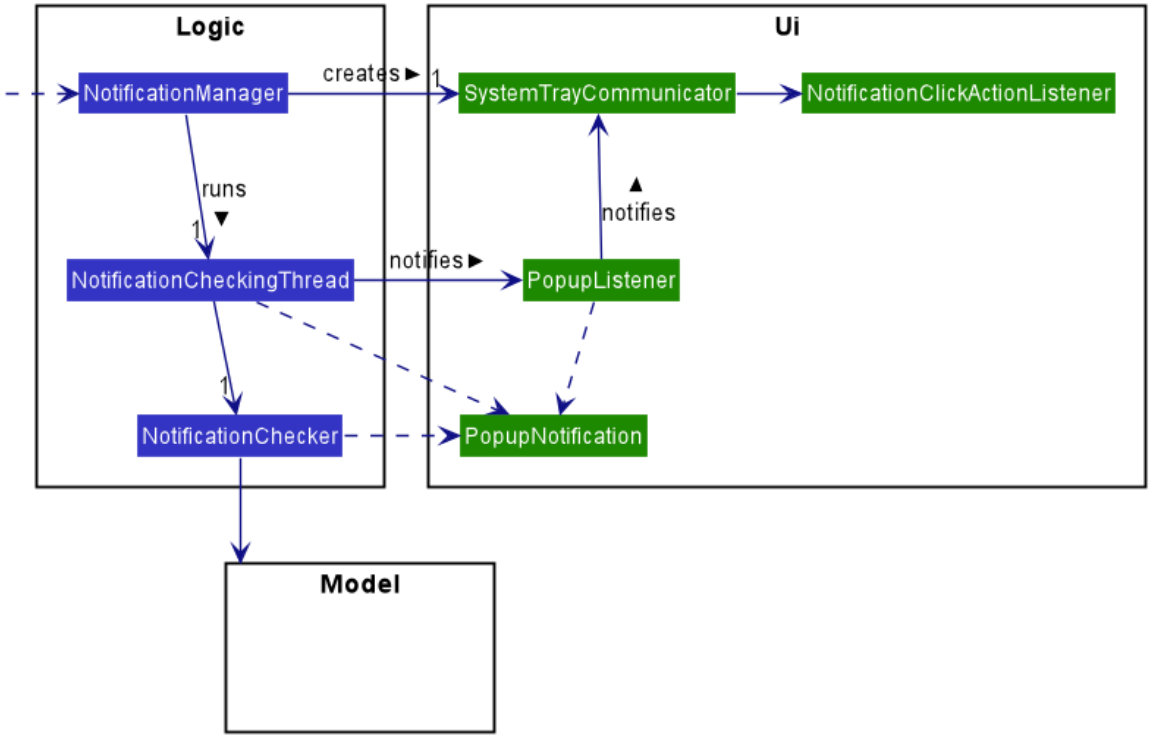



*Figure 12. Class diagram for Notification System*

The Notification System is facilitated by the `NotificationManager`, which is found in the Logic component. Other constituent classes of the Notification System can be found in the Logic and UI components, depending on their functionality. These classes and their functionalities are listed below:

### Logic Classes

Logic classes are responsible for deciding if a notification should be posted. As with other components, their functionality is accessed through the `NotificationManager` class. The `NotificationManager` class maintains a reference to a `NotificationCheckingThread` as well as a `SystemTrayCommunicator`.

The logic classes of the Notification System can be found under the `notification` package under the `Logic` component.

- The `NotificationCheckingThread` is a daemon thread that runs in parallel with the main application. It checks for new notifications to post every minute.
- The `NotificationChecker` is responsible for checking `Model` for any notifications that need to be posted.

#### UI Classes

UI classes are responsible for displaying notifications to the user.

The UI classes of the Notification System can be found under the `systemtray` package under the `ui` component.

- The `PopupListener` class is the main channel of communication between the logic and UI classes. When a notification needs to be posted, it will relay the information from the logic to UI classes.
- The `SystemTrayCommunicator` handles posting notifications and displaying the app's icon on the System Tray. It listens to the `NotificationCheckingThread` through a `PopupListener`.
- The `PopupNotification` class carries the information that will be posted to a popup notification.
- The `NotificationClickActionListener` is called when the user clicks on a popup notification.

### 4.2.2. Class Behaviour

As with other Manager classes, an instance of the `NotificationManager` is created upon the starting of MainApp. The NotificationManager proceeds to initialize and run a `NotificationCheckingThread`, as well as a `SystemTrayCommunicator`. Upon being started, the `NotificationCheckingThread` will enter a `notificationCheckingLoop` by calling its method of the same name.

To give a better explanation of how the `NotificationCheckingThread` works, a single run of its loop is illustrated below:

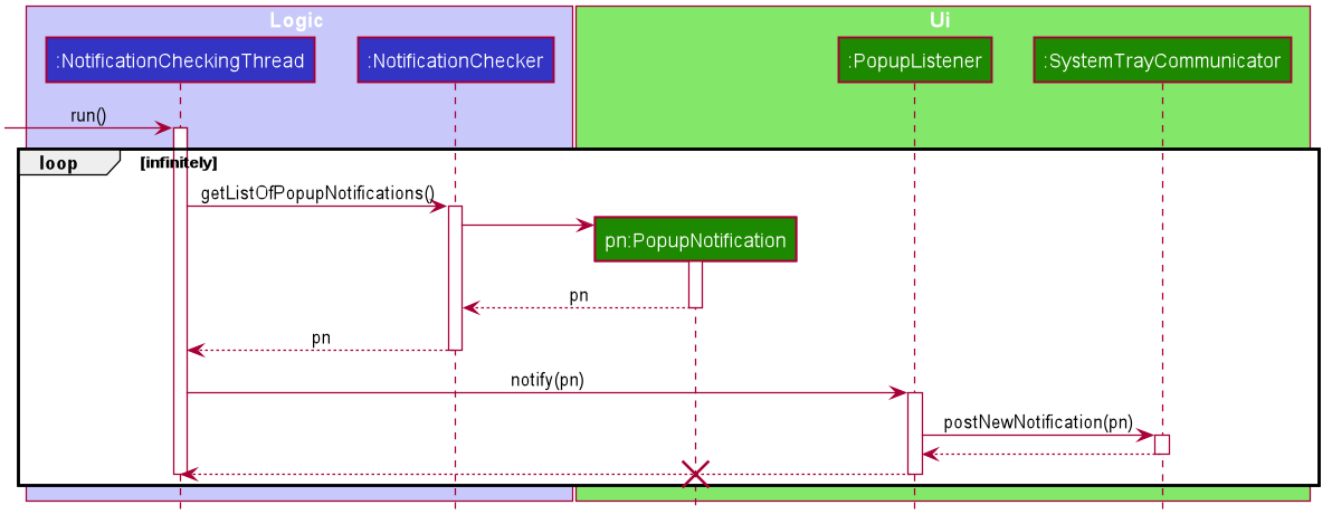



*Figure 13. Sequence diagram for NotificationCheckingThread's main loop*

Step 1. The `NotificationCheckingThread` calls the `NotificationChecker` to generate instances of `PopupNotification` through a call to `NotificationChecker#getListOfPopupNotifications()`

Step 2. For each `PopupNotification` generated by the NotificationChecker, a call to `PopupListener#notify()` is made.

Step 3. This prompts the `SystemTrayCommunicator` to post a new notification.

Step 4. The `NotificationCheckingThread` sleeps until the start of the next minute, found by the method `NotificationCheckingThread#findMillisecondsToNextMinute()`.

### 4.2.3. Design Considerations

**Aspect: How the Notification system should run**

- **Alternative 1 (current choice):** Running the Notification system as a separate thread in the same application
  - Pros: Easier to implement and test.
  - Cons: The user would have to leave the application on if they always wanted to be notified.
- **Alternative 2:** Running the Notification system as a background application
  - Pros: This would allow notifications to be posted to the user's desktop even if the Horo main app were not open.
  - Cons: This would require the creation of a separate application that the user would have to install on their computer. Because different Java applications are ran in different instances of Java Virtual Machines, this could vastly complicate implementation as the Notification System and the rest Horo would be unable to interact directly.

Alternative 1 was eventually chosen as it was simpler to implement and test, and remain within the initial scope of Horo's development. The application can be potentially changed to use Alternative 2 in the future.

## 4.3. Logging

We are using `java.util.logging` package for logging. The `LogsCenter` class is used to manage the logging levels and logging destinations.

- The logging level can be controlled using the `logLevel` setting in the configuration file (See [Implementation-Configuration])
- The `Logger` for a class can be obtained using `LogsCenter.getLogger(Class)` which will log messages according to the specified logging level
- Currently log messages are output through: `Console` and to a `.log` file.

**Logging Levels**

- `SEVERE` : Critical problem detected which may possibly cause the termination of the application
- `WARNING` : Can continue, but with caution
- `INFO` : Information showing the noteworthy actions by the App
- `FINE` : Details that is not usually noteworthy but may be useful in debugging e.g. print the actual list instead of just its size

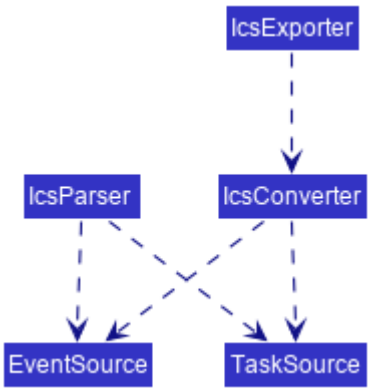
## 4.4. Ics Component

**API** : `IcsParser.java`

The ICS component is made up of 2 main sub-components: ICS file parser, and ICS file exporter.

The file parser makes use of a custom parser that converts files with the `.ics` file extension to `EventSource` and `TaskSource` objects in Horo.

Here is an overview of how the ICS component looks like:




The file exporter uses the `IcsConverter` class to convert `EventSource` and `TaskSource` objects stored in the `ModelManager` singleton object into their ICS String representations. Check out the iCalendar Wiki Page for more information on the specifications.

- Can export Horo's save data as a file The `ICS` Component,with a `.ics` extension.
- Can import other Horo's save data from a `.ics` file.

### 4.4.1. Design Considerations

**Aspect: Handling of Horo TaskSource and EventSource conversion to ICS Strings**

- **Alternative 1 (Current Choice):** Use of a separate class `IcsConverter` to convert `TaskSource` and `EventSource` objects their ICS string representations.
  - Pros: Adherence to Single Responsibility Principle, decouples `IcsExporter` from the `TaskSource` and `EventSource` classes, and keeps code reusable and scalable.
  - Cons: Not consistent with Object-Oriented Programming structure.
- **Alternative 2:** Create a common `IcsConvertible` Interface for `TaskSource` and `EventSource` to implement a `toIcsString()` function.
  - Pros: Adheres to Object-Oriented Programming structure.
  - Cons: Hard to reuse functions and modify code.

Alternative 1 was chosen eventually, as I felt that it is more important to adhere to the Single Responsibility Principle and keep all code relevant to converting objects to ICS Strings in the same class.

This further makes it easier for future debugging, and makes adding new exportable objects a lot easier as there are common functions that can be used. === UI Component

# 5. Documentation

Refer to the guide here.

# 6. Testing

Refer to the guide here.

# 7. Dev Ops

Refer to the guide here.

# Appendix A: Product Scope

**Target user profile**:

- is a student
- has a need to manage their Events and Tasks for visualization.
- requires reminders for their Events and Tasks.
- prefer desktop apps over other types
- can type fast
- prefers typing over mouse input
- is reasonably comfortable using CLI apps

**Value proposition**: manage Reminders as well as viewing Events and Tasks much faster than a typical mouse/GUI driven app

# Appendix B: User Stories

Priorities: High (must have) - * * *, Medium (nice to have) - * *, Low (unlikely to have) - *

| Priority | As a … | I want to … | So that I can… |
|---|---|---|---|
| * * * | new user | see usage instructions | refer to instructions when I forget how to use the App |
| * * * | user | add an Event or Task | keep track of an Event or Task that I have in the future |

| Priority | As a … | I want to … | So that I can… |
|---|---|---|---|
| * * * | user | delete an Event or Task | remove the Event or Task I no longer need. |
| * * * | user | find an Event or Task by name | locate the details of the Event or Task without having to go through the entire list |
| * * * | user | find an Event or Task by tags | remember the details of the Event or Task that I forget about |
| * * * | user | undo and redo commands | undo any commands which wrongly inputted |
| * * * | user | edit my Events and Tasks | change the details of the event, be it location, date or time |
| * * * | user that works on multiple computer | port my data between computers | keep track on all my computers. |
| * * * | student | have constant reminders to track the deadline of my assignments | not forget to complete and submit them |
| * * * | student | keep track of how long it takes for me to complete a task | gauge how long I will need to take for future similar tasks |

| Priority | As a … | I want to … | So that I can… |
| --- | --- | --- | --- |
| * * * | student with weekly assignments and lectures | have my reminders to be recurring | be reminded without having to input the information in again |
| * * * | busy student | have a convenient way to visually see my assignments and projects | complete them in the right priority |
| * * * | busy user | be informed if any different events clash with each other | understand which event to prioritize or reschedule |
| * * | user | add a contacts | add them into Events to remind myself who I am meeting up with |
| * * | user | archive my completed Tasks | remind myself if I complete a task but forgot about it |
| * * | user | create custom commands that contain the execution of multiple sub-commands | quickly input in a command without the need to edit it |
| * * | student | visualize my timetable | plan for when it is time to take a break from studying |

| Priority | As a … | I want to … | So that I can… |
|---|---|---|---|
| * * | student | find a time for my project teammates to meet up | schedule a meeting without clashing together with other events |
| * | user | import contacts in vCard format | integrate them with my events |
| * | user | export contacts in vCard format | integrate them with my other computers |
| * | student | keep track of sub-tasks in a main task | know my current progress in a report |

*{More to be added}*

# Appendix C: Use Cases

(For all use cases below, the **System** is the `Horo` and the **Actor** is the `user`, unless specified otherwise)

## Use case 1: Add a Task

**MSS**

1. User requests to add a Task
2. Horo replies that the Task has been added

   Use case ends.

**Extensions**

- 1a. The user adds additional sub-commands to the Task command

  Use case ends.

- 2a. The given add Task command is of the wrong format.

  2a1. Horo displays an error message.

  Use case resumes at step 1.

## Use case 2: Delete a Task

**MSS**

1. User requests to delete a specific Task from the already displayed list
2. Horo deletes the Task

   Use case ends.

**Extensions**

2a. The given delete Task command is of the wrong format.

2a1. Horo displays an error message.

Use case resumes at step 1.

# Use case 3: Find a Task by name

**MSS**

1. User requests to find a Task
2. Horo displays the list of Task with the keywords found in its name

   Use case ends.

**Extensions**

2a. The given find Task command is of the wrong format.

2a1. Horo displays an error message.

Use case resumes at step 1.

# Use case 4: Undo and Redo commands

**MSS**

1. User requests to add an Task
2. Horo replies that the Task has been added
3. User requests to undo the command
4. Horo replies that the previous command has been undone

   Use case ends.

**Extensions**

- 1a. The user adds additional sub-commands to the Task command

  Use case ends.

- 2a. The given add Task command is of the wrong format.

    2a1. Horo displays an error message. Use case resumes at step 1

- 4a. User decides the to Redo the added Task

    3a1. Horo replies that the added Task has been redone

    Use case ends

## Use case 5: Edit a Task

**MSS**

1. User requests to add a Task
2. Horo replies that the Task has been added
3. User request to edit a Task with the sub-commands
4. Horo replies that the Task has been edited

    Use case ends.

**Extensions**

- 1a. The user adds additional sub-commands to the Task command

    Use case ends.

- 2a. The given add Task command is of the wrong format.

    2a1. Horo displays an error message.

    Use case resumes at step 1.

- 4a. The given edit Task command is of the wrong format.

    4a1. Horo displays an error message.

    Use case resumes at step 3.

    *{More to be added}*

# Appendix D: Non Functional Requirements

1. Should work on any mainstream OS as long as it has Java 11 or above installed.
2. Should be able to hold up to 1000 Events and Tasks without a noticeable sluggishness in performance for typical usage.
3. Should function on both `32-bit environment` and `64-bit environment`
4. Should work without any internet required.
5. A user with above average typing speed for regular English text (i.e. not code, not system admin

commands) should be able to accomplish most of the tasks faster using commands than using the mouse. .

*{More to be added}*

# Appendix E: Glossary

**Mainstream OS**

Windows, Linux, Unix, OS-X

**Event**

A thing that happens or takes place during a certain period of time, or of a general time.

**Task**

A piece of work that is to be completed or taken note of.

# Appendix F: Product Survey

**reminder-bot on Discord**

Author: JellyWX

Pros:

- A reminder bot on a popular voice and text chat application
- Capable of parsing english language as compared to CLI styled commands

Cons:

- Lack of visualization of the Events and Tasks
- Parsing english language makes it slower to type with a longer requirement as compared to CLI styled commands

**Google Calendar**

Company: Google

Pros:

- A Calendar application that is capable of storing Events and Tasks as well.
- Mostly uses GUI for interaction with user instead of having CLI, favouring to the common crowd.

Cons:

- Mostly uses GUI for interaction with user instead of having CLI, which does not favour those who prefers CLI.
- It requires an account to be usable.

- The desktop version requires a browser, which in turn requires Internet and hence not offline.

# Appendix G: Instructions for Manual Testing

Given below are instructions to test the app manually.

| | |
|---|---|
| **NOTE** | These instructions only provide a starting point for testers to work on; testers are expected to do more *exploratory* testing. |

## G.1. Launch and Shutdown

1. Initial launch
    a. Download the jar file and copy into an empty folder
    b. Double-click the jar file
    Expected: Shows the GUI with a set of sample contacts. The window size may not be optimum.
2. Saving window preferences
    a. Resize the window to an optimum size. Move the window to a different location. Close the window.
    b. Re-launch the app by double-clicking the jar file.
    Expected: The most recent window size and location is retained.

*{ more test cases … }*